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A SURVEY OF POUND NET CATCHES NEAR THE CHESAPEAKE BAY
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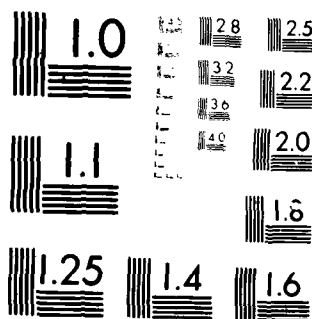
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A Survey of Point West Island Near the
Chesapeake Bay Mouth off Lynnhaven, Virginia.

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Ray S. Birdsong, Robin L. Bedenbaugh and Randal D. Owen
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A Survey of Pound Net Latches Near the
Chesapeake Bay Mouth off Lynnhaven, 1973-1983.

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Introduction.

Pound netting is a traditional and wide-spread commercial fishing technique in the Chesapeake Bay and its major tributaries. The pound net, a form of fish weir, is a fixed apparatus that diverts and then traps fishes as they move along the shore line.

All types of fishing gear possess some catch bias due to design or use and, therefore, catch some species more readily than others. For migratory species greater than 5-6 inches in length, the pound net appears to exhibit a smaller sampling bias than other commonly employed techniques. This suggests that it should provide a useful sampling device for the illucidation of the seasonal movement and abundance of migratory species through an area.

Over 20 years ago Joseph (1962) recommended the long-term monitoring of pound nets as a means of evaluating the year class strength of some migratory species. However, no intensive pound net monitoring program has been established in Virginia, probably due to the realization by Joseph and others (McHugh, 1960) that the species compositions of the catch of pound nets vary significantly among locales. The catch of any individual net, therefore may well reflect local composition and abundance, but poorly reflect conditions over a broader area. Consequently, the monitoring of pound nets, as suggested by Joseph, for determining year class strength, would require a program both intensive in time and extensive throughout the area in question.



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This study was begun in 1982 to augment a more extensive trawl and gillnet program designed to provide information on the abundance and occurrence of fishes in those areas of Hampton Roads and the entrance channels proposed for deepening by the U. S. Army Corps of Engineers, Norfolk District. As originally conceived, the pound net monitoring program was not to be intensive, but rather a monthly survey of catch at a single pound net located just east of the mouth of Lynnhaven Inlet (Fig. 1). The primary objective of the study was to utilize the pound net catch to provide information on those species rarely taken by other fishing techniques. The study was later expanded to include the historical catch records of the net through the kind cooperation of Mr. George Ross, then owner of the net, who made his daily catch records available to us for the years 1973 through 1982. These historical catch data form the focus of this paper and have been used to determine seasonal abundance patterns. We also have evaluated their utility in determining annual abundance patterns in the hope that they may be useful in estimating annual abundance for some species for which little or no catch data exist.

Methods and Materials.

The data obtained in this study are of two distinct sorts: 1) the monthly monitoring data from 1982 and 1983; and 2) the daily catch records of saleable species from 1973 through 1981.

In 1982-83 the monitoring consisted of recording the abundance of each species taken on a single net pull once, or occasionally twice, each month. Actual counts were taken where possible and poundage was taken where abundance was too great for a count of individuals. Since many large species of no commercial value are discarded at the net or in transit, we accompanied the fishermen to the net and took data on board as well as at the landing dock. The data from 1982 and 1983 have been used primarily to provide information on seasonality and abundance of non-commercial species in the Cape Henry area.

Information on catches from 1973 through 1981 came from the daily logs of Mr. George Ross who owned and fished the nets during these years. The logs list pounds of each species of commercial value. In two cases the categories are composites of more than one species. The categories "trash" or "bait" were used to identify those species of no commercial value as well as size classes with no market value. These categories were usually dominated by menhaden and small bluefish, but frequently contained a variety of species in small numbers. No detailed information on the species composition of the bait or trash categories exists.

Two closely related species, the butterfish and the harvestfish, were often not separated but lumped as "butterfish" in the logs. We treat both species as a single category in this paper.

We have converted catches from the Ross pound net into

catch-per-unit-effort (CPUE) values because the days fished varied from year to year. The unit of effort used is a single net pull. It should be noted that not all net pulls represent the same number of fishing days for, occasionally, weather or some other factor would prevent a net pull on a given day. Regardless of this variability in days between pulls, we feel that catch per net pull more accurately reflects the year to year abundance than does comparison of total catch of a species.

Comparative information from pound nets in Northampton County and from total Virginia catches have not been converted to CPUE values because no effort information exists.

Seasonal Abundance.

During the 1982-83 monitoring program, 84 species of fishes distributed among 45 families were recorded in the pound net catch. Table 1 lists these species and shows their months of occurrence and relative abundance. The subjective abundance categories are defined as follows: abundant - occurred throughout the season in large numbers; common - occurred frequently in small numbers; occasional - occurred several times each year in small numbers; uncommon - seen more than once during the two years, but usually no more than 3 times; rare - seen only once during the two years of monitoring; accidental - species normally too small to be entrapped.

Thirty-five species were common to abundant in the area during 1982-83. While approximately fifty species of fishes with some commercial value are at least occasionally taken in the pound net, the marketable catch over the period 1973-81 was dominated by only 7 species (Table 2). Three species croaker, spot, and bluefish, account for 75 percent of the edible catch.

While many species occur over a relatively broad portion of the year, most show some peaks in abundance during their period of occurrence. Nine of the commercially most important species were analyzed for monthly abundance (Figs. 2 - 4). The data for these abundance histograms come from 564 net pulls over the nine year period 1973-81.

Of the species analyzed, only spot (Fig. 2C), weakfish (Fig. 3A), and shad (Fig. 3C) show a single peak of abundance. All other species (butterfish and harvestfish, croaker, bluefish, Spanish mackerel, king mackerel) show a bimodal distribution with a peak in the spring or early summer and another in late summer or early fall. In all of these species the summer minimum is in August, the month in which water temperatures are near maximum. The bimodality of abundance of these species is, no doubt, the result of inshore-offshore and/or north-south migration patterns.

Historical Abundance.

The catch data from the Ross logs, 1973-81, were compiled and converted to pounds per net pull to eliminate

year to year differences in effort. To evaluate these data as indicators of abundance, seven species (considering the butterfish and harvestfish as one) were compared to catch data for all gear types for Virginia (Fig. 5 - 11). While the total state catch cannot be converted to catch per unit effort, we feel that the large size of the data set along with the variety of effort types, greatly dampen the effects of any year to year shifts in effort.

Abundance as estimated by the pound net catch was similar to that as estimated by total state landings for five of the seven species used in the comparison. Some of the discrepancies between the two data sets are explainable and are commented on below.

Atlantic croaker (Fig. 5). Catch trends were similar between the data sets for all years except 1977. We have no explanation for this difference.

Spot (Fig. 6). Of the nine comparative years, only 1973 varies markedly between the data sets, with the pound net catch indicating a low abundance and the state catch a high abundance.

Bluefish (Fig. 7). The trends in bluefish abundance as indicated by the pound net catch bear little resemblance to those seen in the total state catch. The concentrated and mobile nature of bluefish schools makes them poor candidates for estimating abundance through fixed gear catches. Figure 7 also shows the catch of bluefish in pound nets from the north side of the bay mouth in Northhampton County. While

neither the Ross pound net catch nor the Northampton pound net catch resemble the state catch trends, the two pound net catches show an interesting inverse correlation to each other. This inverse correlation is the apparent result of the tendency for the bluefish schools to concentrate on one side of the bay mouth or the other in a given year. The factors causing these differences in location of the schools have not been explored.

Weakfish (Fig. 8). The difference in the data sets for the year 1975 is most likely due to the Ross pound net not being fished for a portion of the weakfish season in that year. Apparent trends in abundance are similar for other years.

Butterfish and harvestfish (Fig. 9). Since we have no information on the relative contributions of the two species grouped together in this category, it is not possible to speculate on the difference in the trends of the two data sets for the years 1980 and 1982. Catch trends for 1973-79 are similar in both sets of data.

American shad (Fig. 10). There appears to be little agreement between the two data sets for American shad. Because of weather and market factors, the amount of effort by the Ross pound net during the shad season shows considerable variability from year to year. Only in 1975 and 1976 was the pound net fished in February when the shad run begins. For species which are present in the fishery for only a short period, the CPUE values are sensitive to low levels of effort

and become more variable and hence, less reliable.

Summer flounder (Fig. 11). There is reasonably good agreement between the data sets in abundance trends.

Conclusions.

The general agreement between the two data sets in apparent abundance trends for most species, indicates to us the utility of pound net catches for estimating the abundance of many fish species in a given year, being mindful of the following caveats.

1. Species occurring over a short portion of the fishing season (eg. shad) or highly migratory species with strong schooling tendencies (eg. bluefish) are likely to yield unreliable estimates of relative abundance.
2. The monitoring of the pound net catch should be frequent and spread throughout the fishing season. We suggest a minimum sampling frequency of once each week.
3. Abundance estimates derived from pound net catches should be applied to areas away from the pound net vicinity only with considerable caution.

Acknowledgements

We wish to thank the following: Mr. George Ross and Mr. Kenny Ethridge for allowing us to examine their catches and providing access to their records; Mr. William Kelly and Mr. Anthony Sylva of the National Marine Fisheries Service,

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Joseph, E. B. 1962. Industrial or scrapfish catch from pound nets in lower Chesapeake Bay - 1960. Virginia Institute of Marine Science. Spec. Sci. Rpt. No. 35, 47 pp. (Mimeo).

McHugh, J. L. 1960. The pound net fishery in Virginia, part 2 - species composition of landings reported as menhaden. Comm. Fish. Rev. 22(2):1-16.

Table 1: Relative Seasonal Abundance of Fish Species Taken in the Ross Pound Net, 1982-83 at Lynnhaven, Virginia (abundant = abd; common = com; occasional = ooc; uncommon = unc; rare = rar; accidental = acc).

Species	Month(s) of Occurrence	Abundance
Lampreys		
<u>Petromyzon marinus</u> (sea lamprey)	Mar-Apr	Ooc
Requiem Sharks		
<u>Mustelus canis</u> (smooth dogfish)	May-Nov	Ooc-Abd
Dogfish Sharks		
<u>Squalus acanthias</u> (spiny dogfish)	Apr	Com
Skates		
<u>Raja eglanteria</u> (clearnose skate)	Apr-Nov	Com-Abd
<u>Raja erinacea</u> (little skate)	Mar-Apr	Rar
Stingrays		
<u>Dasyatis americana</u> (s. stingray)	Aug	Unc
<u>Dasyatis centroura</u> (rough-tail stingray)	Oct	Rar
<u>Dasyatis sabina</u> (Atl. stingray)	Jul-Oct	Ooc
<u>Dasyatis sayi</u> (bluntnose stingray)	May-Oct	Com
<u>Gymnura micrura</u> (smooth butterfly ray)	Aug	Unc
Eagle Rays		
<u>Myliobatus freminvillei</u> (bullnose ray)	Jun-Oct	Com
<u>Rhinoptera bonasus</u> (cownose ray)	May-Oct	Com-Abd
Sturgeons		
<u>Acipenser oxyrinchus</u> (Atl. sturgeon)	Mar-Apr	Ooc
Tarpons		
<u>Elops saurus</u> (ladyfish)	Sep-Oct	Ooc
<u>Megalops atlanticus</u> (tarpon)	Sep	Rar
Herrings		
<u>Alosa aestivalis</u> (blueback herring)	Apr-Jul	Abd (Apr-May) Ooc (Jun-Jul)
<u>Alosa mediocris</u> (hickory shad)	Apr-Nov	Ooc
<u>Alosa pseudoharengus</u> (alewife)	Apr-Jul	Abd (Apr-May) Ooc (Jun-Jul)
<u>Alosa sapidissima</u> (American shad)	Apr-Jul	Abd (Apr-May) Ooc (Jun-Jul)
<u>Brevoortia tyrannus</u> (Atl. menhaden)	Apr-Nov	Abd
<u>Dorosoma cepedianum</u> (gizzard shad)	Apr-Nov	Com (Apr-May) Ooc (Jun-Nov)
<u>Opisthonema oglinum</u> (Atl. thread herring)	Jun-Sep	Com (Jun)

Table 1: Con't.

Species	Month(s) of Occurrence	Abundance
Anchovies		
<u>Anchoa mitchilli</u> (bay anchovy)	---	Acc
Lizardfishes		
<u>Synodus foetens</u> (inshore lizardfish)	Aug-Oct	Occ
Carp and Minnows		
<u>Cyprinus carpio</u> (common carp)	Apr-May	Unc
Toadfishes		
<u>Opsanus tau</u> (oyster toadfish)	May-Oct	Occ
Goosefishes		
<u>Lophius americanus</u> (goosefish)	Mar-Apr	Unc
Codfishes		
<u>Merluccius bilinearis</u> (silver hake)	Mar-Apr	Occ
<u>Urophycis chuss</u> (red hake)	Apr	Com
<u>Urophycis regia</u> (spotted hake)	Apr-Nov	Com
Silversides		
<u>Menidia menidia</u> (Atl. silverside)	---	Acc
Temperate Basses		
<u>Morone americana</u> (white perch)	May-Oct	Unc
<u>Morone saxatilis</u> (striped bass)	Mar-May	Occ
Sea Basses		
<u>Centropistes striatus</u> (black sea bass)	Apr-May	Occ
<u>Mycteroperca microlepis</u> (gag)	Sep-Oct	Rar
Bluefishes		
<u>Pomatomus saltatrix</u> (bluefish)	Apr-Nov	Abd
Cobias		
<u>Rachycentron canadum</u> (cobia)	Oct	Unc
Remoras		
<u>Echeneis naucrates</u> (sharksucker)	Jun-Oct	Occ
Jacks		
<u>Caranx chrysos</u> (blue runner)	Sep-Oct	Com
<u>Caranx hippos</u> (crevalle jack)	Sep-Oct	Com
<u>Oligoplites saurus</u> (leatherjacket)	Jul-Aug	Unc
<u>Selene vomer</u> (lookdown)	Sep-Oct	Com
<u>Selene setapinnis</u> (Atl. moonfish)	Jun-Oct	Com

Table 1: Con't.

Species	Month(s) of Occurrence	Abundance
<u>Seriola dumerili</u> (greatdb amberjack)	Aug	Unc
<u>Seriola dumerili</u> (greatdb amberjack)	Aug	Unc
<u>Seriola zonata</u> (banded rudderfish)	Jul	Occ
<u>Trachinotus carolinus</u> (Florida pompano)	Jun-Oct	Com
Grunts		
<u>Orthopristis chrysoptera</u> (pigfish)	Jun-Oct	Occ-Com
Porgies		
<u>Archosargus probatocephalus</u> (sheepshead)	May	Unc
<u>Stenotomus chrysops</u> (scup)	Sep-Oct	Occ
Drums		
<u>Bairdiella chrysura</u> (silver perch)	Apr-Oct	Occ-Com
<u>Cynoscion nebulosus</u> (spotted seatrout)	Apr-Nov	Occ
<u>Cynoscion regalis</u> (weakfish)	Apr-Nov	Abd
<u>Leiostomus xanthurus</u> (spot)	Apr-Nov	Abd
<u>Larimus fasciatus</u> (banded drum)	Jul	Unc
<u>Menticirrhus americanus</u> (s. kingfish)	Apr-Oct	Occ
<u>Menticirrhus littoralis</u> (gulf kingfish)	Jul	Occ
<u>Micropogonias undulatus</u> (Atl. croaker)	Apr-Nov	Com
<u>Pogonias cromis</u> (black drum)	Apr-May	Occ
<u>Sciaenops ocellata</u> (red drum)	Nov	Occ
Spadefishes		
<u>Chaetodipterus faber</u> (Atl. spadefish)	Oct	Unc
Wrasses		
<u>Tautoga onitis</u> (tautog)	Mar-May	Occ
Mullet		
<u>Mugil cephalus</u> (striped mullet)	Oct-Nov	Com-Abd
Barracudas		
<u>Sphyraena borealis</u> (n. sennet)	Jun-Jul	Unc
Stargazers		
<u>Astroscopus guttatus</u> (n. stargazer)	Nov	Unc
Cutlassfishes		
<u>Trichiurus lepturus</u> (Atl. cutlassfish)	May-Oct	Com
Mackerels		
<u>Euthynnus alletteratus</u> (little tunny)	Oct	Unc
<u>Sarda sarda</u> (Atl. bonito)	Sep	Unc
<u>Scomber scombrus</u> (Atl. mackerel)	Mar-Apr	Occ

Table 1: Con't.

Species	Month(s) of Occurrence	Abundance
<u>Scomberomorus cavalla</u> (king mackerel)	Jun-Oct	Occ
<u>Scomberomorus maculatus</u> (Spanish mackerel)	May-Oct	Com
Butterfishes		
<u>Peprilus alepidotus</u> (harvestfish)	May-Nov	Abd
<u>Peprilus triacanthus</u> (butterfish)	Apr-Nov	Abd
Searobins		
<u>Prionotus carolinus</u> (n. searobin)	Aug-Oct	Occ
<u>Prionotus evolans</u> (striped searobin)	Apr-Nov	Com
Lefteye Flounders		
<u>Paralichthys dentatus</u> (summer flounder)	Apr-Nov	Com-Abd
<u>Scophthalmus aquosus</u> (windowpane)	Apr-Nov	Com
Righteye Flounders (wint. flounder)		
<u>Pseudopleuronectes americanus</u>	Mar-Apr	Unc
Soles		
<u>Trinectes maculatus</u> (hogchoker)	Apr-Oct	Com
Tonguefishes		
<u>Symphurus plagiatus</u> (blackcheek tonguefish)	Apr-Nov	Occ
Filefishes and Triggerfishes		
<u>Alutera schoepfi</u> (orange filefish)	Jul-Aug	Occ
<u>Balistes capriscaus</u> (gray triggerfish)	Jul-Oct	Occ
<u>Monacanthus hispidus</u> (planehead filefish)	Aug	Occ
Puffers		
<u>Sphoeroides maculatus</u> (n. puffer)	Apr-Oct	Com
Porcupinefishes		
<u>Chilomycterus schoepfi</u> (striped burrfish)	May-Oct	Occ-Com

Table 2. Distribution among categories of the total catch in the Ross pound net, 1973-81 at Lynnhaven, Virginia.

Category	Percent of Catch
"Bait" and "Trash"	51.6
Croaker	18.9
Spot	10.6
Bluefish	7.1
Butterfish and Harvestfish	2.3
American Shad	1.9
All Other Edible Species	2.5
	100

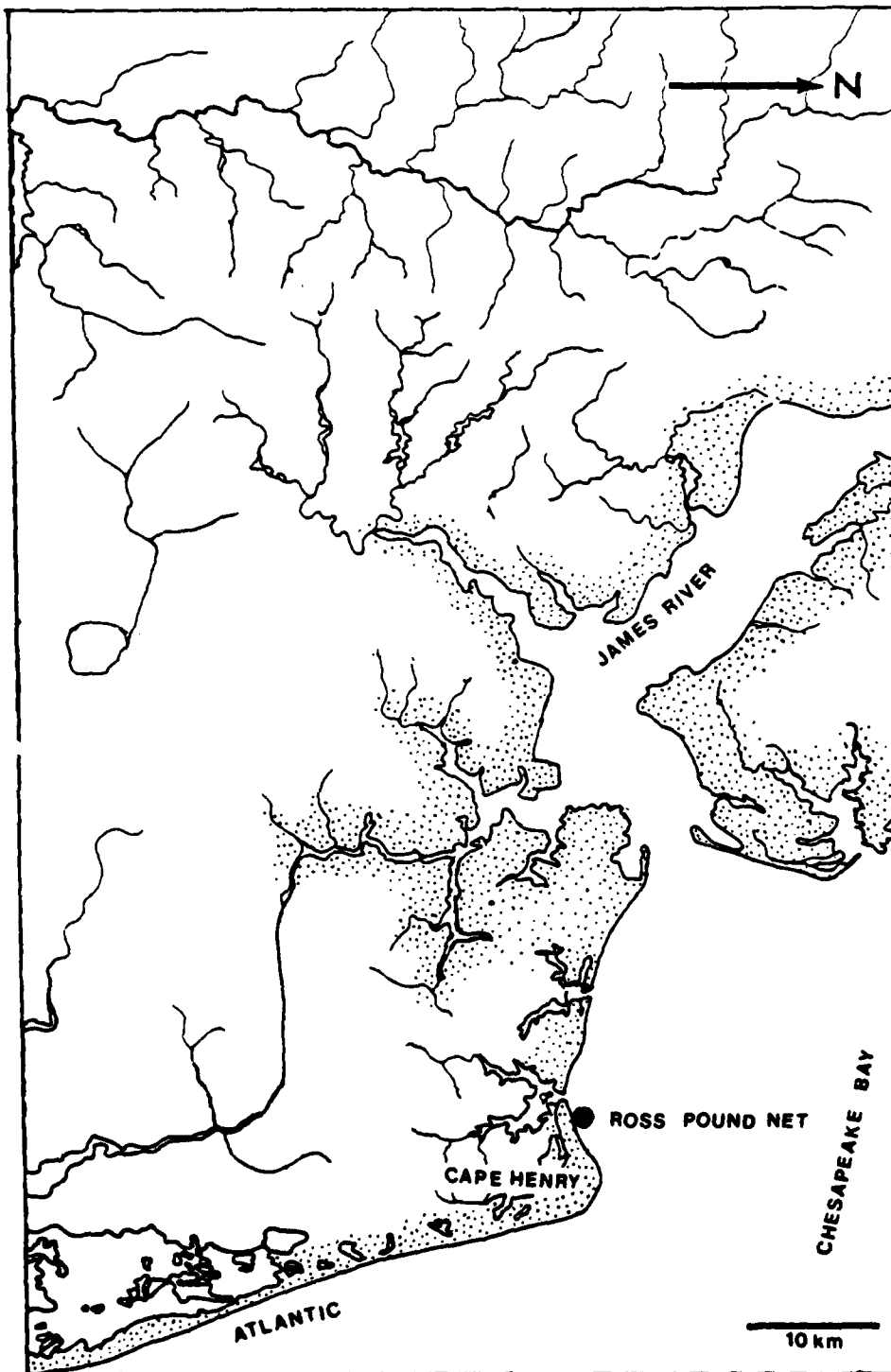


Figure 1. Location of the Ross pound net at Lynnhaven, Virginia Beach, Virginia.

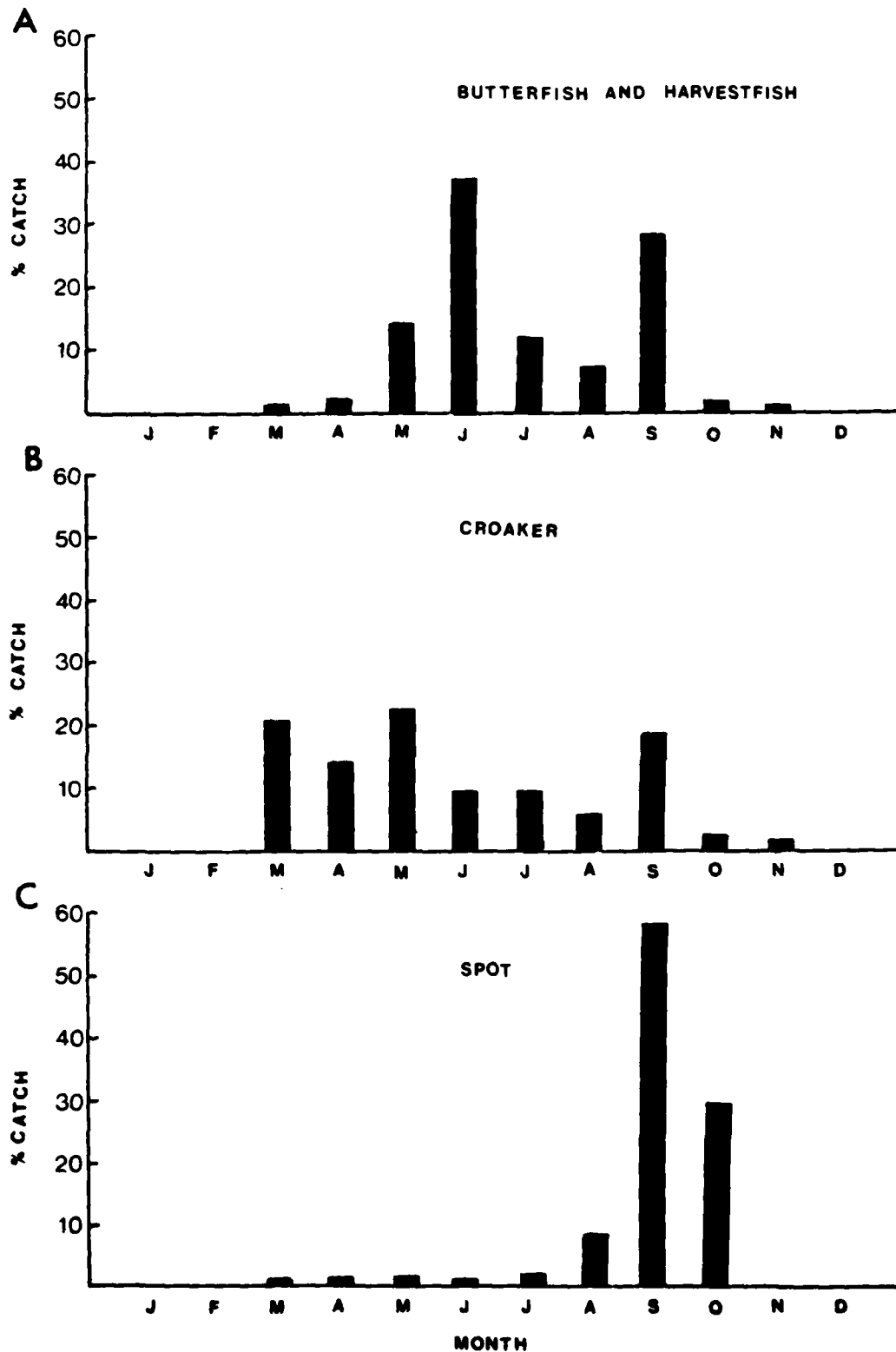


Figure 2. Distribution of catch by month for the Ross pound net, 1973-81. A - butterfish and harvestfish. B - croaker. C - spot.

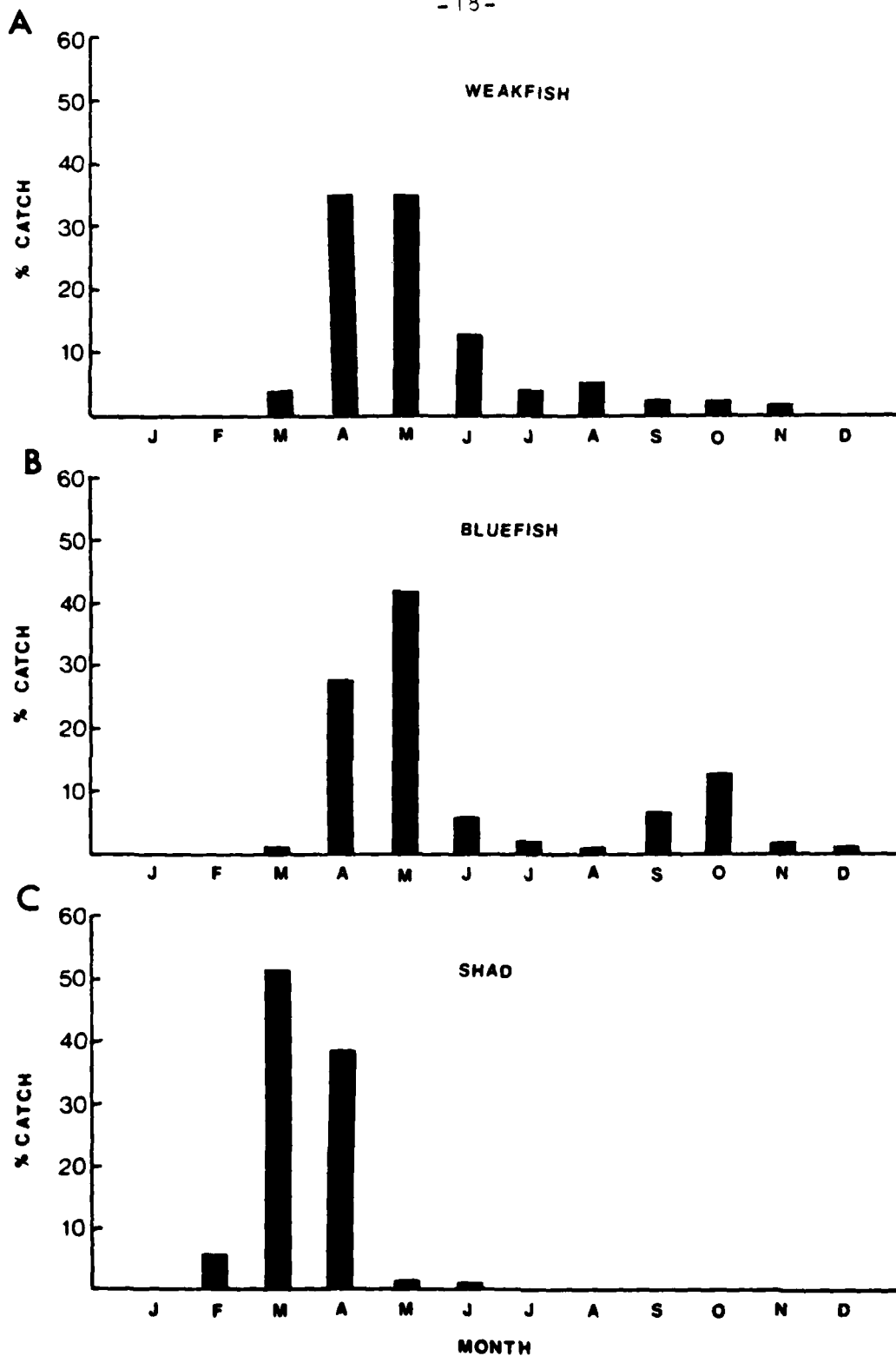


Figure 3. Distribution of catch by month for the Ross poundnet, 1973-81. A - weakfish. B - bluefish. C - American shad.

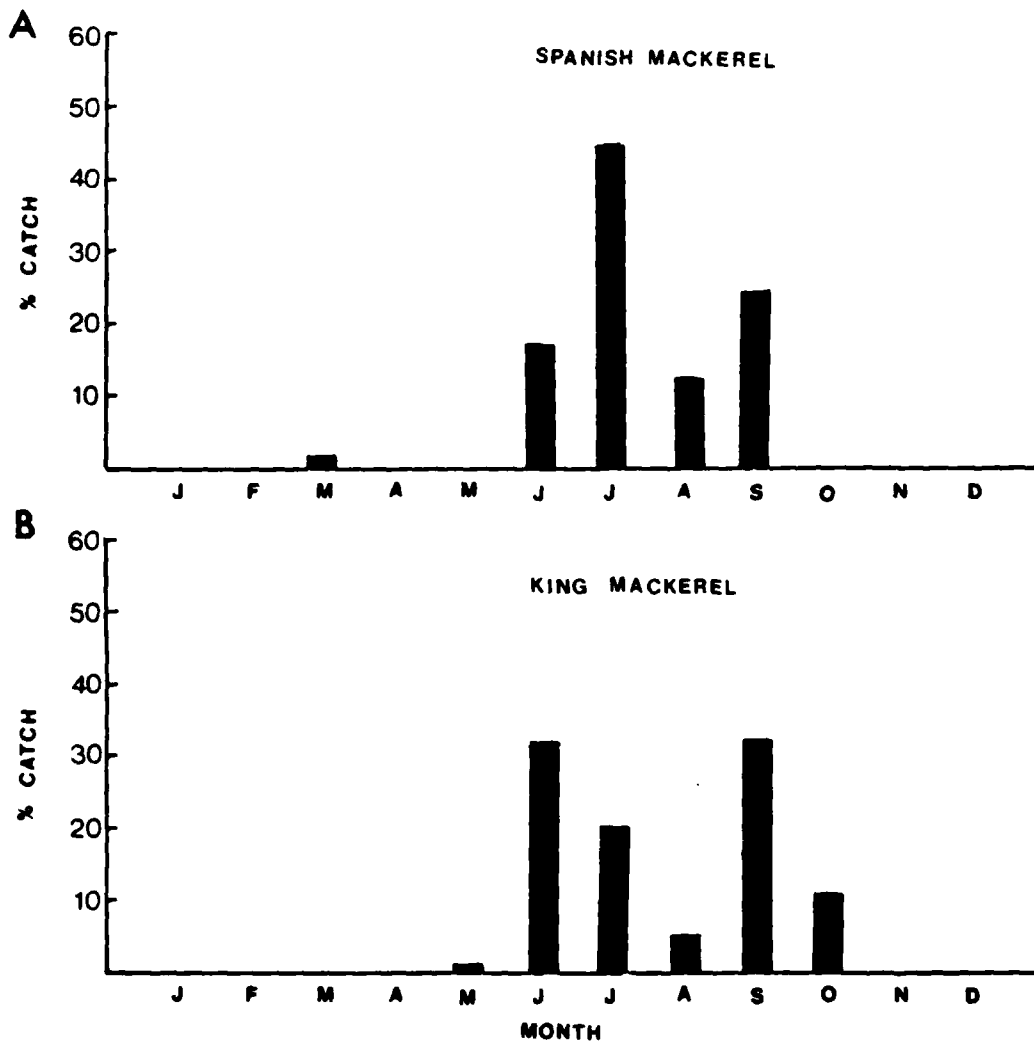


Figure 4. Distribution of catch by month for the Ross pound net, 1973-81. A - Spanish mackerel. B - king mackerel.

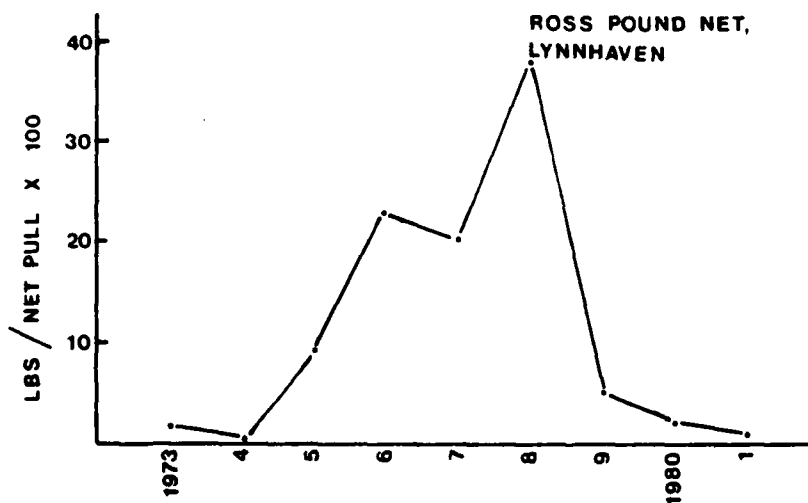
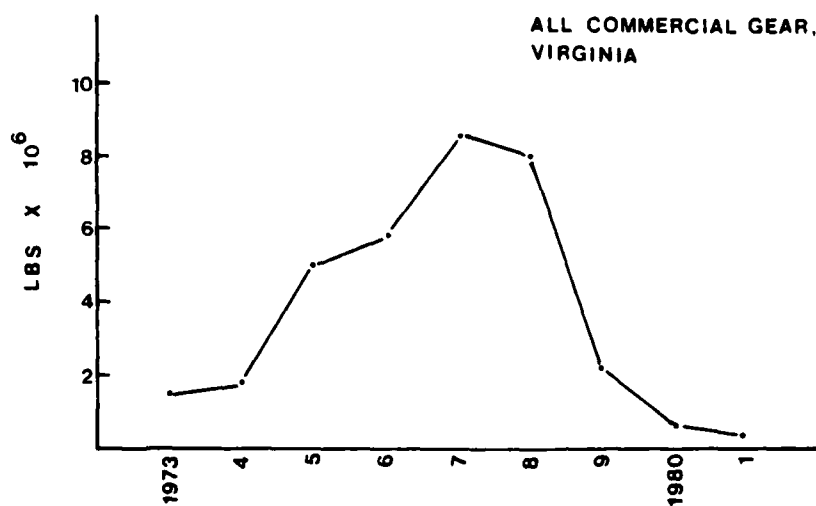


Figure 5. Atlantic croaker, comparison of Ross pound net catch with total commercial catch for Virginia from 1973-81.

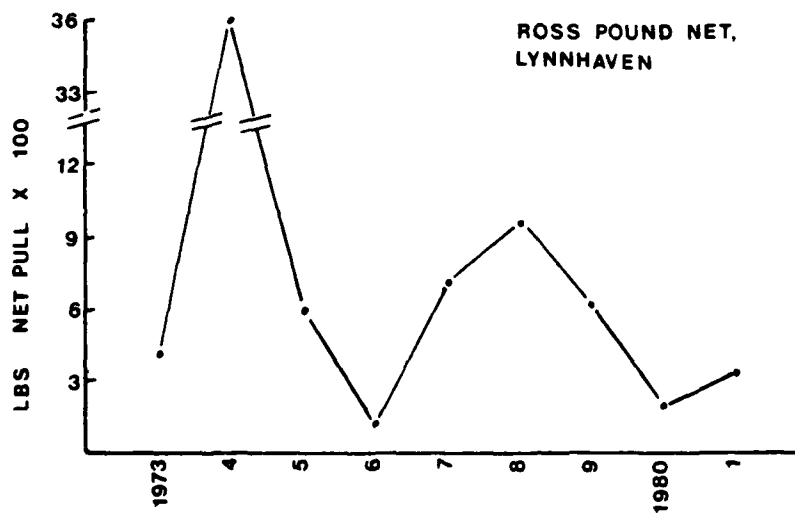
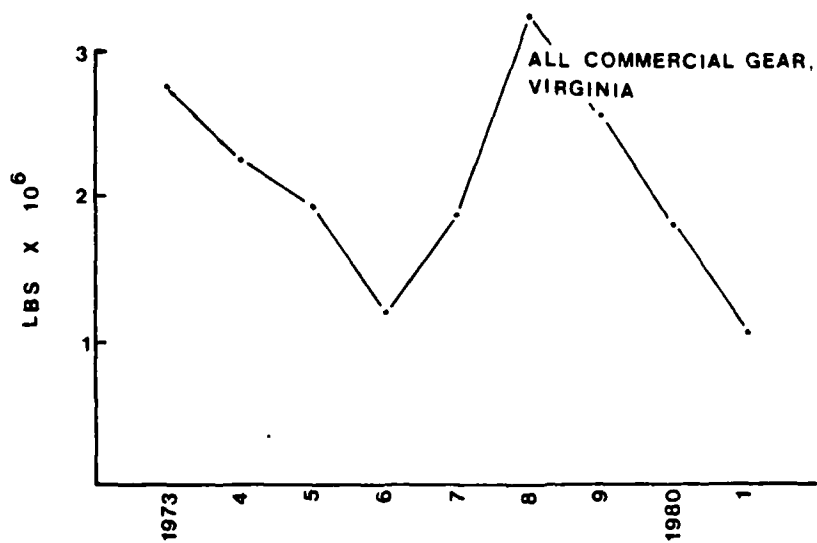


Figure 6. Spot, comparison of Ross pound net catch with total commercial catch for Virginia from 1973-81.

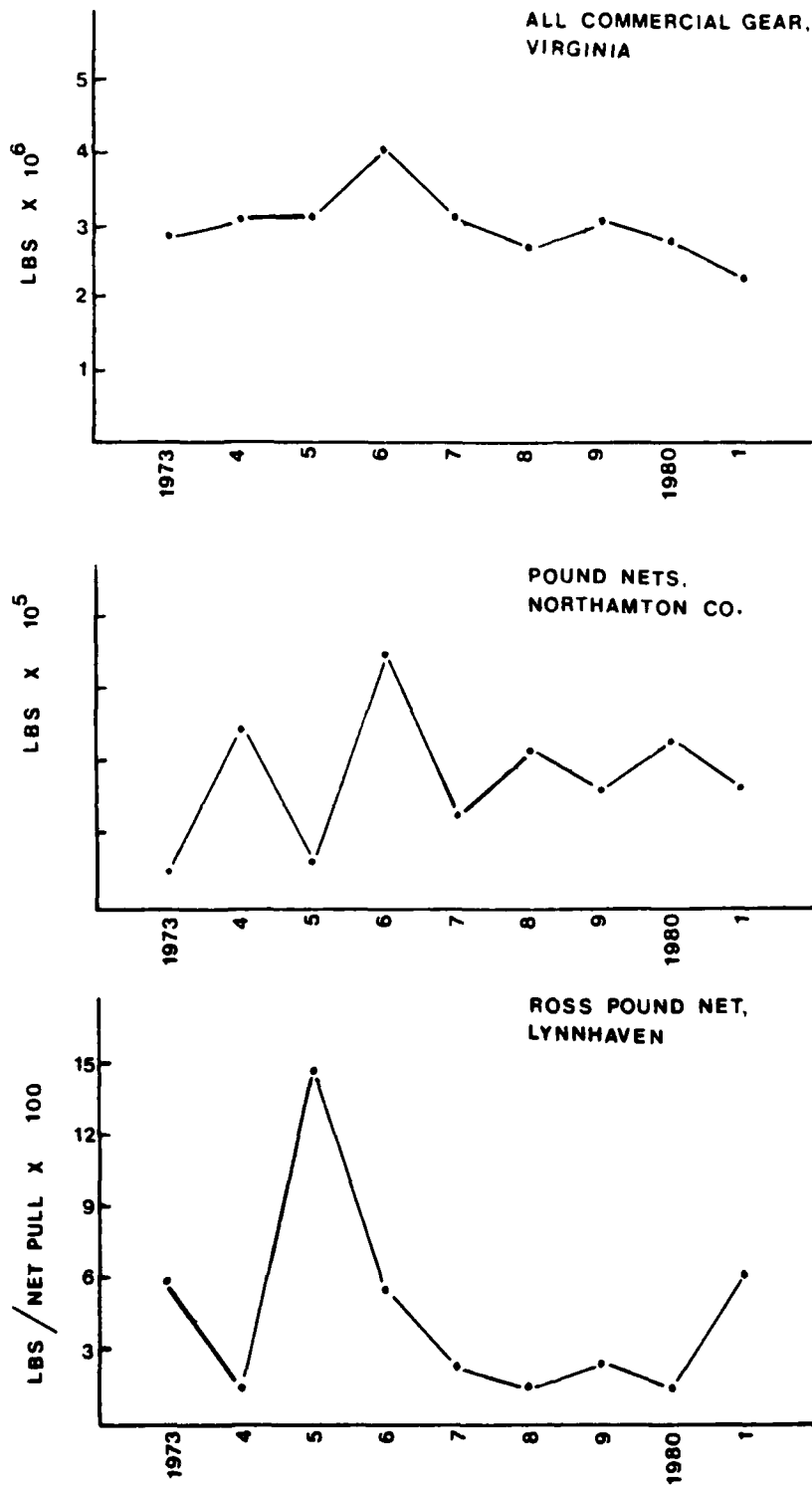


Figure 7. Bluefish, comparison of Ross pound net catch from Northampton County pound nets and total and total commercial catch for Virginia from 1973-1981.

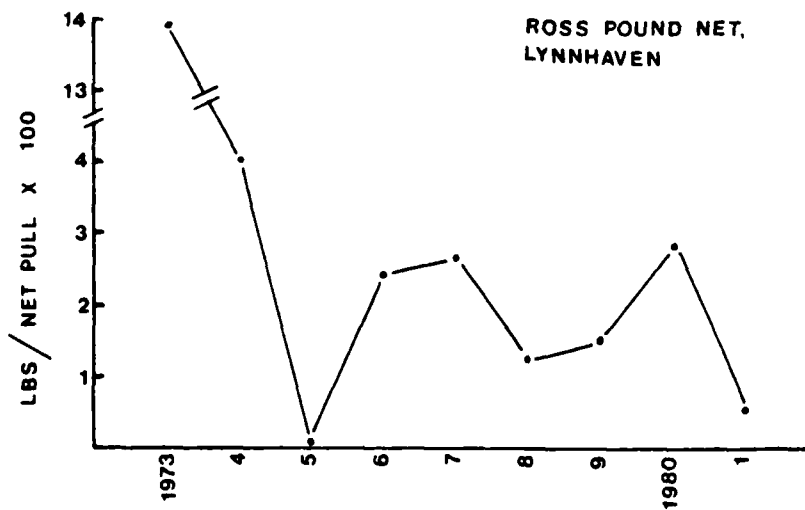
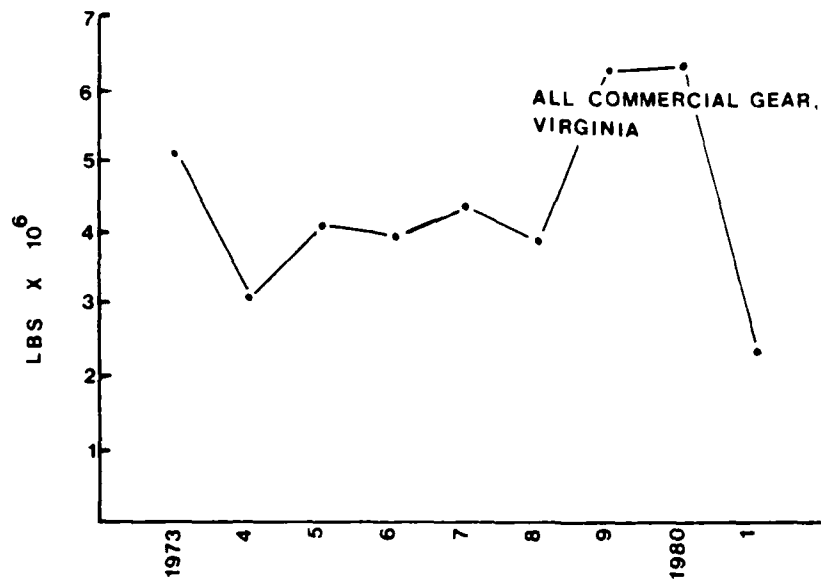


Figure 8. Weakfish, comparison of Ross pound net catch with total commercial catch for Virginia from 1973-81.

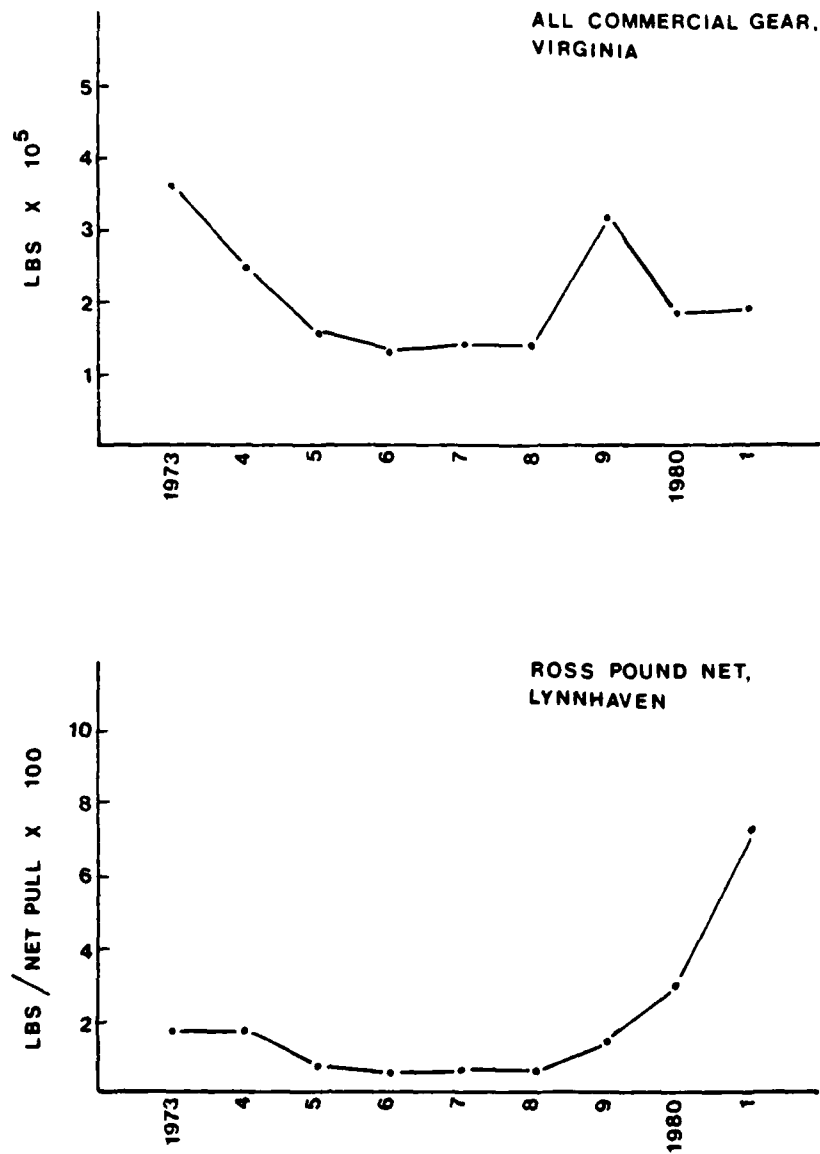


Figure 9. Butterfish and harvestfish combined, comparison of Ross pound net catch with total commercial catch for virginia from 1973-81.

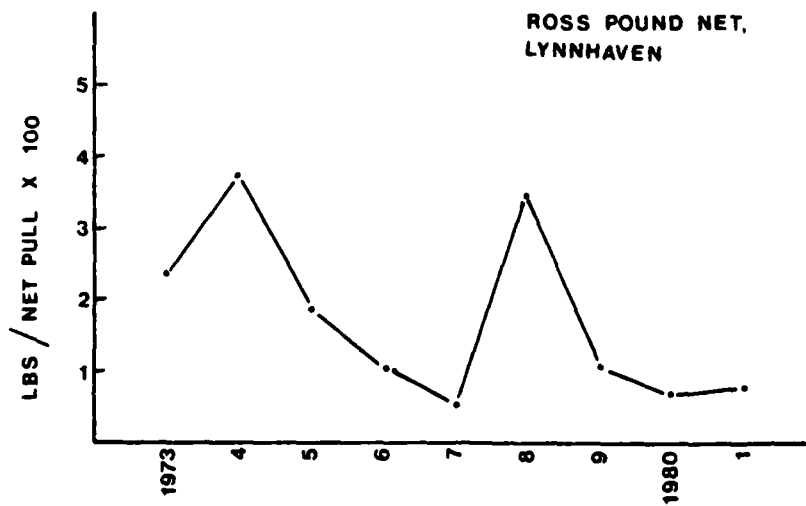
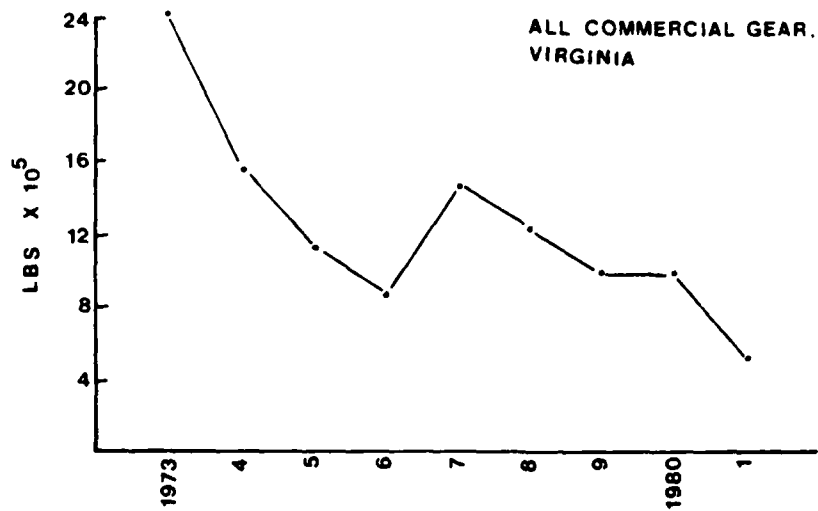


Figure 10. American shad, comparison of Ross pound net catch with total commercial catch for Virginia from 1973-81.

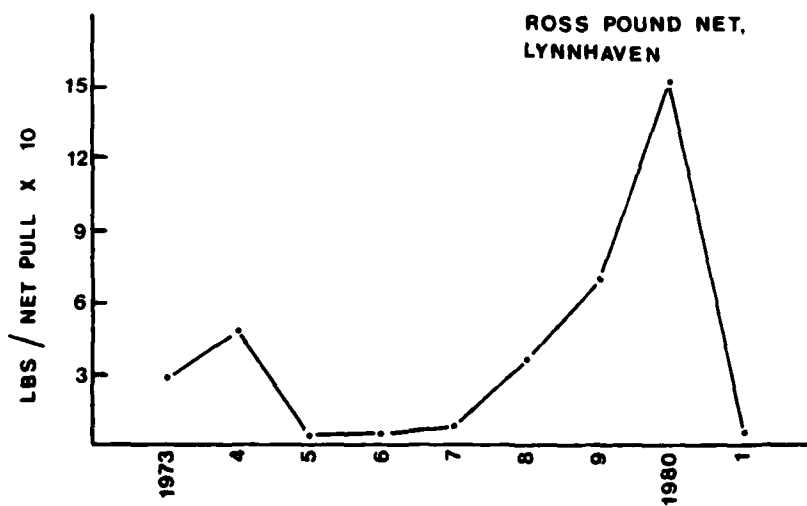
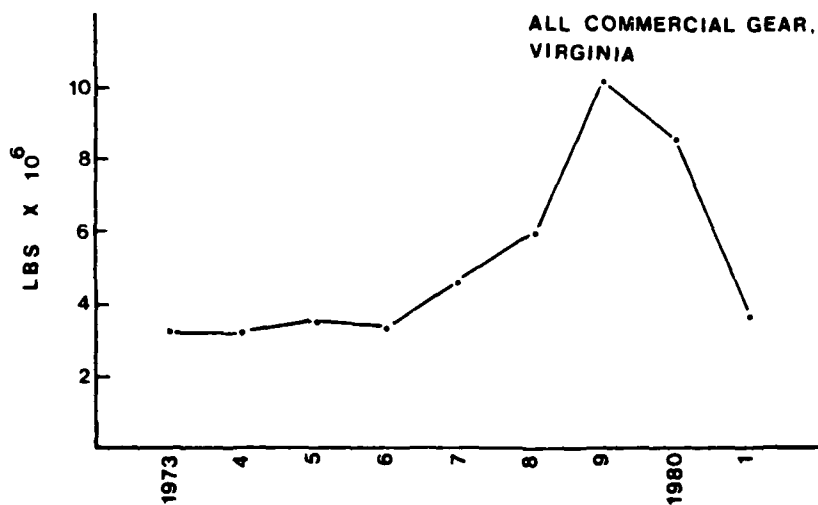


Figure 11. Summer flounder, comparison of Ross pound net catch with total commercial catch for Virginia from 1973-81.

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